



INSTITUTO FEDERAL
Ceará

Eletrônica para Informática

Mapas de Karnaugh



MAPAS DE KARNAUGH

2 VARIÁVEIS

	\overline{B}	B
\overline{A}	0	1
A	2	3

3 VARIÁVEIS

	\overline{B}	B		
\overline{A}	0	1	3	2
A	4	5	7	6
	\overline{C}	C	\overline{C}	

4 VARIÁVEIS

	\overline{C}	C			
\overline{A}	0	1	3	2	\overline{B}
	4	5	7	6	B
A	12	13	15	14	
	8	9	11	10	\overline{B}
	\overline{D}	D	\overline{D}		



MAPAS DE KARNAUGH

5 VARIÁVEIS

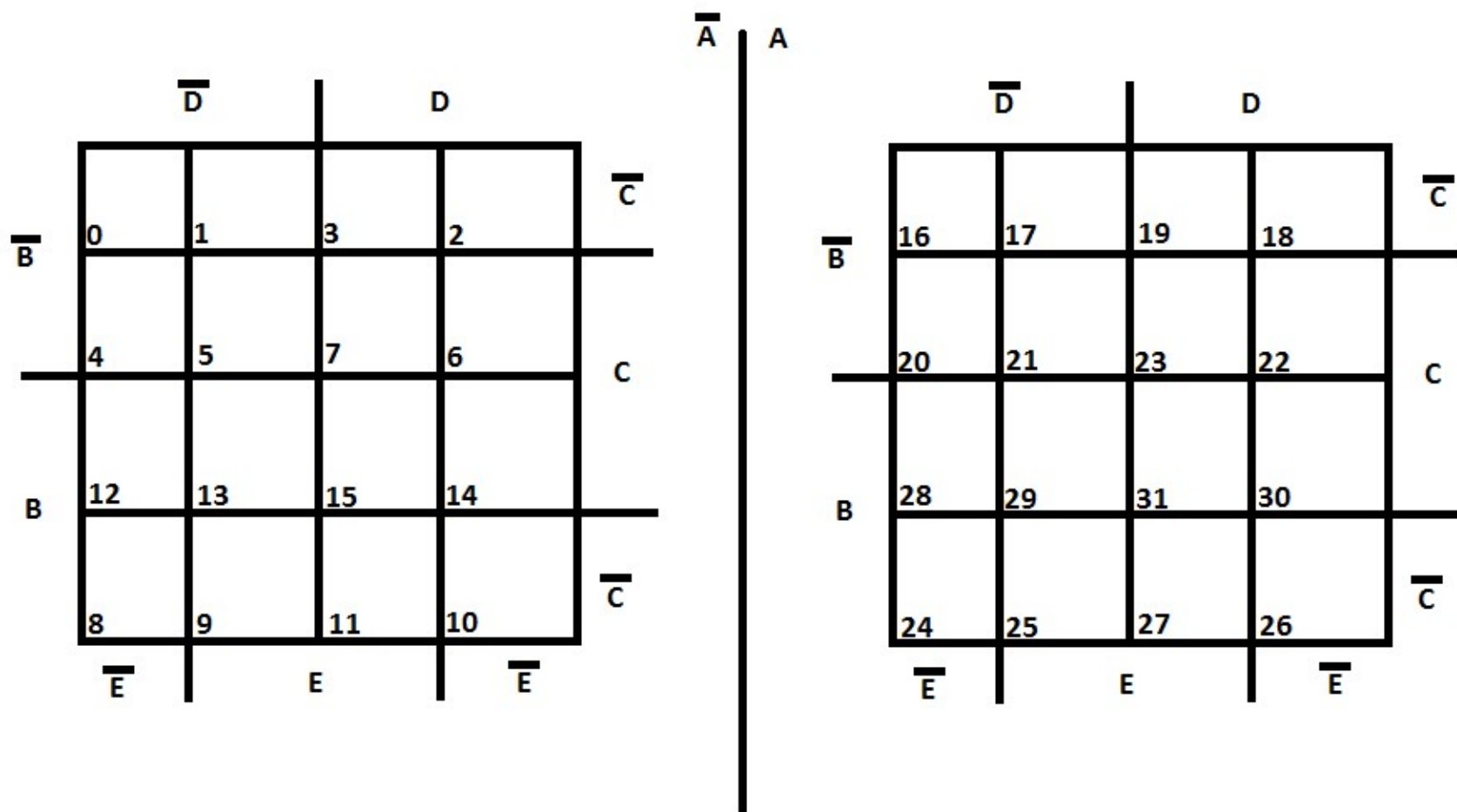




TABELA VERDADE

CASO	A	B	C	S
0	0	0	0	1
1	0	0	1	0
2	0	1	0	1
3	0	1	1	1
4	1	0	0	1
5	1	0	1	0
6	1	1	0	1
7	1	1	1	0

3 VARIÁVEIS

	\bar{B}		B	
\bar{A}	0	1	3	2
A	4	5	7	6
	\bar{C}	C	\bar{C}	C

	\bar{B}		B	
\bar{A}	Caso 0 1	Caso 1 0	Caso 3 1	Caso 2 1
A	Caso 4 1	Caso 5 0	Caso 7 0	Caso 6 1
	\bar{C}	C	\bar{C}	C



Obtenção da Expressão

1. Unir blocos de 1's adjacentes;
2. Buscar a formação de blocos com a maior quantidade de 1's possível (Potências de 2 - pares, quadras, oitavas, etc); buscar a menor quantidade de blocos possíveis;
3. Na expressão de cada bloco, elimina-se as variáveis que mudam de estado dentro do bloco; As variáveis que não mudam de estado são mantidas na expressão representando seu valor fixo no bloco :
 - Unidade : nenhuma variável eliminada
 - Par: uma variável eliminada
 - Quadra: duas variáveis eliminadas
 - Oitava: três variáveis eliminadas...

A expressão final será a “soma” das expressões de cada bloco.



	\overline{B}		B
\overline{A}	1	0	1
A	1	0	1
	\overline{C}	C	\overline{C}



	\bar{B}	B
\bar{A}	1	1
A	1	1
	\bar{C}	C

\Leftarrow Par $\bar{A}B$

\Leftarrow Quadra \bar{C}

	\bar{B}	B
\bar{A}	1	1
A	1	1
	\bar{C}	C

$S = \bar{A}B + \bar{C}$



INSTITUTO FEDERAL

Ceará

TABELA VERDADE

CASE	A	B	C	D	S
0	0	0	0	0	0
1	0	0	0	1	1
2	0	0	1	0	1
3	0	0	1	1	1
4	0	1	0	0	0
5	0	1	0	1	1
6	0	1	1	0	0
7	0	1	1	1	1
8	1	0	0	0	1
9	1	0	0	1	1
10	1	0	1	0	0
11	1	0	1	1	1
12	1	1	0	0	1
13	1	1	0	1	1
14	1	1	1	0	0
15	1	1	1	1	1

4 VARIÁVEIS

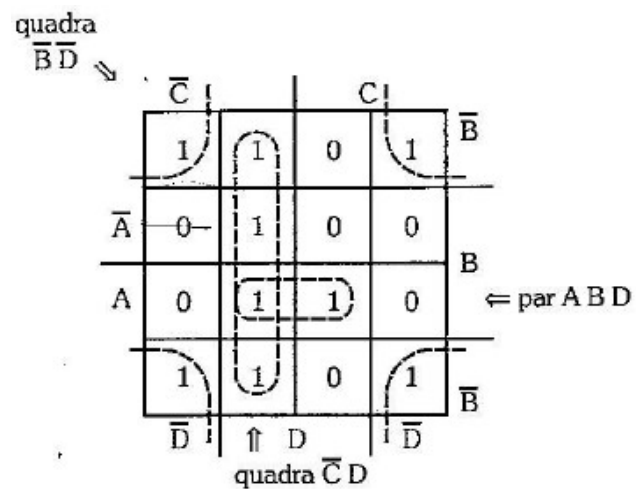
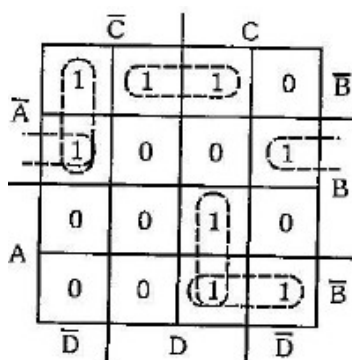
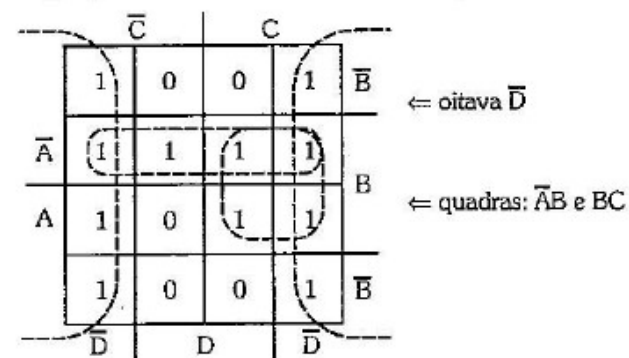
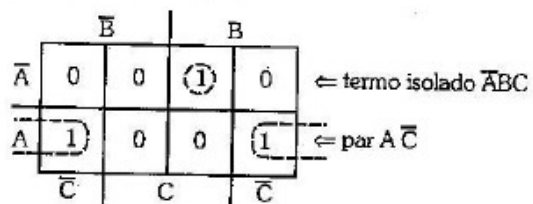
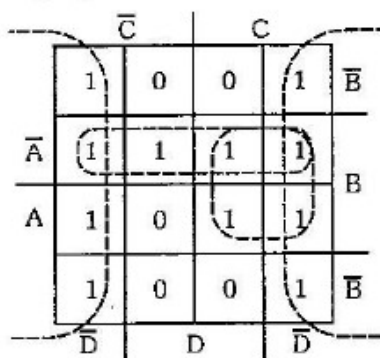
		\bar{C}		C		
		0	1	3	2	\bar{B}
\bar{A}	4	5	7	6		\bar{B}
A	12	13	15	14		\bar{B}
	8	9	11	10		\bar{B}
		\bar{D}	D	\bar{D}		

		\bar{C}		C		
		0	1	1	1	\bar{B}
\bar{A}	0	0	1	1	0	B
A	1	1	1	1	0	\bar{B}
		\bar{D}	D	\bar{D}		



		\bar{C}		C		
\bar{A}	0	1	1	1	\bar{B}	
	0	1	1	0		
A	1	1	1	0	B	
	1	1	1	0		
		\bar{D}	D	\bar{D}		

$S = D + A\bar{C} + \bar{A}\bar{B}C$



DEC	A	B	C	D	E	S
0	0	0	0	0	0	1
1	0	0	0	0	1	1
2	0	0	0	1	0	0
3	0	0	0	1	1	0
4	0	0	1	0	0	1
5	0	0	1	0	1	1
6	0	0	1	1	0	0
7	0	0	1	1	1	0
8	0	1	0	0	0	1
9	0	1	0	0	1	0
10	0	1	0	1	0	0
11	0	1	0	1	1	0
12	0	1	1	0	0	0
13	0	1	1	0	1	0
14	0	1	1	1	0	0
15	0	1	1	1	1	0
16	1	0	0	0	0	1
17	1	0	0	0	1	1
18	1	0	0	1	0	0
19	1	0	0	1	1	0
20	1	0	1	0	0	1
21	1	0	1	0	1	1
22	1	0	1	1	0	1
23	1	0	1	1	1	0
24	1	1	0	0	0	1
25	1	1	0	0	1	0
26	1	1	0	1	0	1
27	1	1	0	1	1	1
28	1	1	1	0	0	0
29	1	1	1	0	1	0
30	1	1	1	1	0	1
31	1	1	1	1	1	1



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	\bar{D}		D		
	0	1	3	2	\bar{C}
\bar{B}	4	5	7	6	
B	12	13	15	14	C
	8	9	11	10	\bar{C}
	\bar{E}	E	\bar{E}		

\bar{A} | A

	\bar{D}	D			
	16	17	19	18	\bar{C}
\bar{B}	20	21	23	22	C
B	28	29	31	30	
	24	25	27	26	\bar{C}
	\bar{E}	E	\bar{E}		

	\bar{D}	D		\bar{A}	A
	1	1	0	0	\bar{C}
\bar{B}	1	1	0	0	
	0	0	0	0	C
B	1	0	0	0	\bar{C}
	\bar{E}	E	\bar{E}		

\bar{A} | A

	\bar{D}	D			
	1	1	0	0	\bar{C}
\bar{B}	1	1	0	1	
	0	0	1	1	C
B	1	0	1	1	\bar{C}
	\bar{E}	E	\bar{E}		

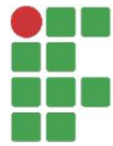


		\bar{D}		D		
\bar{B}	\bar{C}	1	1	0	0	\bar{A}
	C	1	1	0	0	A
B	\bar{C}	0	0	0	0	\bar{A}
	C	1	0	0	0	A

\bar{A}	A
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		\bar{D}		D		
\bar{B}	\bar{C}	1	1	0	0	
	C	1	1	0	1	
B	\bar{C}	0	0	1	1	
	C	1	0	1	1	
		\bar{E}		E		

$$S = \bar{B}\bar{D} + \bar{C}\bar{D}\bar{E} + ABD + ACD\bar{E}$$



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1)

A	B	C	D	E	S
0	0	0	0	0	0
0	0	0	0	1	0
0	0	0	1	0	0
0	0	0	1	1	0
0	0	1	0	0	0
0	0	1	0	1	1
0	0	1	1	0	1
0	0	1	1	1	1
0	1	0	0	0	1
0	1	0	0	1	0
0	1	0	1	0	1
0	1	0	1	1	0
0	1	1	0	0	0
0	1	1	0	1	0
0	1	1	1	0	0
0	1	1	1	1	0
1	0	0	0	0	1
1	0	0	0	1	1
1	0	0	1	0	0
1	0	0	1	1	1
1	0	1	0	0	0
1	0	1	0	1	0
1	0	1	1	0	0
1	0	1	1	1	0
1	1	0	0	0	1
1	1	0	0	1	1
1	1	0	1	0	1
1	1	1	0	0	1
1	1	1	0	1	1
1	1	1	1	0	0
1	1	1	1	1	0

2)

A	B	C	D	E	S
0	0	0	0	0	1
0	0	0	0	1	1
0	0	0	1	0	1
0	0	0	1	1	1
0	0	1	0	0	0
0	0	1	0	1	0
0	0	1	1	0	0
0	0	1	1	1	0
0	1	0	0	0	0
0	1	0	0	1	0
0	1	0	1	0	0
0	1	0	1	1	1
0	1	1	0	0	1
0	1	1	0	1	1
0	1	1	1	0	1
0	1	1	1	1	0
1	0	0	0	0	1
1	0	0	0	1	0
1	0	0	1	0	1
1	0	0	1	1	0
1	0	1	0	0	0
1	0	1	0	1	0
1	0	1	1	0	1
1	0	1	1	1	0
1	1	0	0	0	1
1	1	0	0	1	0
1	1	0	1	0	1
1	1	1	0	0	1
1	1	1	0	1	0
1	1	1	1	0	1
1	1	1	1	1	0

3)

A	B	C	D	S
0	0	0	0	0
0	0	0	1	0
0	0	1	0	1
0	0	1	1	1
0	1	0	0	0
0	1	0	1	1
0	1	1	0	1
0	1	1	1	1
1	0	0	0	0
1	0	0	1	1
1	0	1	0	0
1	0	1	1	1
1	1	0	0	0
1	1	0	1	0
1	1	1	0	0
1	1	1	1	1

4)

A	B	C	D	S
0	0	0	0	1
0	0	0	1	1
0	0	1	0	0
0	0	1	1	1
0	1	0	0	0
0	1	0	1	0
0	1	1	0	1
0	1	1	1	0
1	0	0	0	1
1	0	0	1	1
1	0	1	0	0
1	0	1	1	1
1	1	0	0	1
1	1	0	1	0
1	1	1	0	0
1	1	1	1	0

5)

A	B	C	S
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

Exercícios:

Encontre as expressões booleanas simplificadas que representam as TV's abaixo: